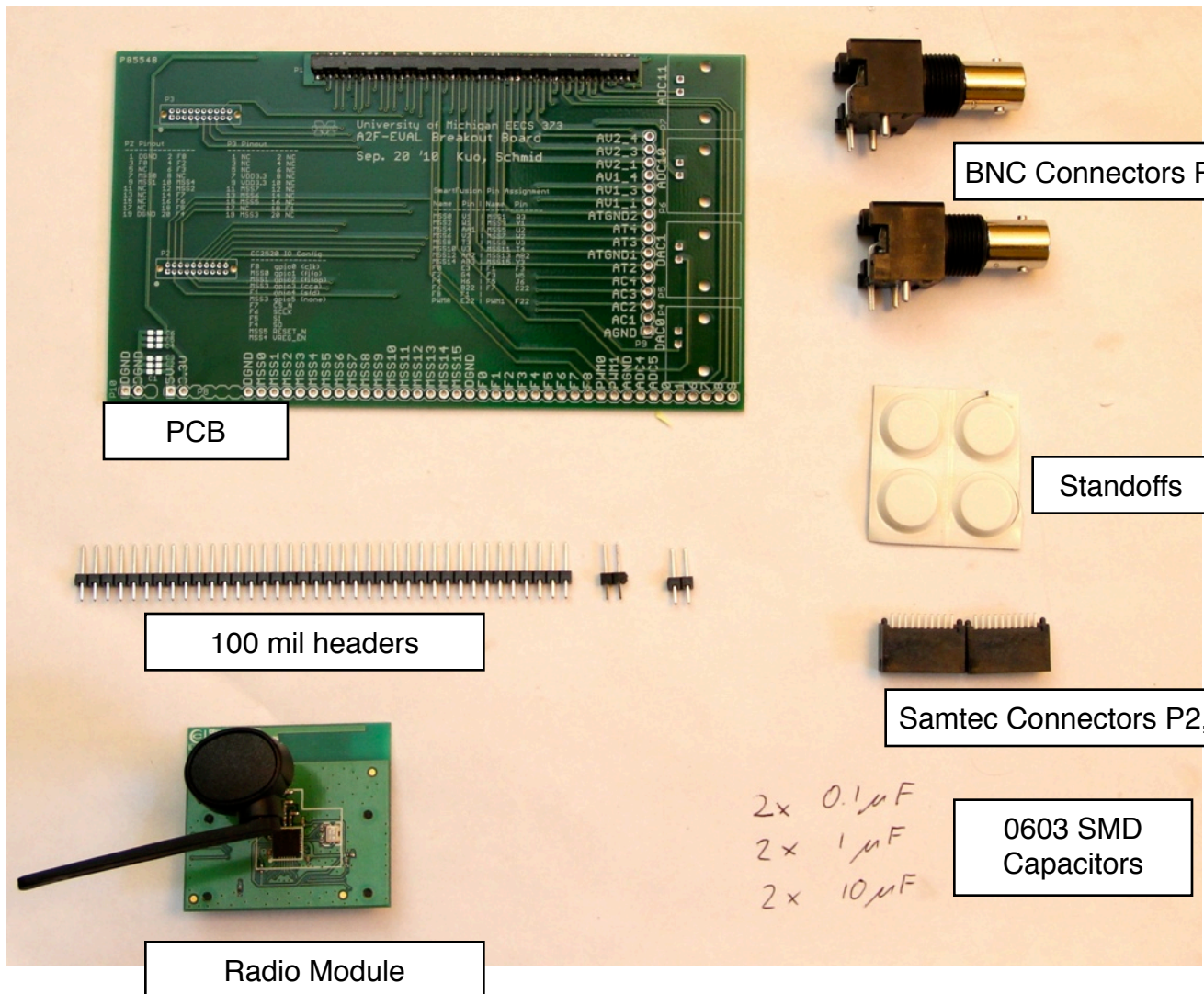


# Assembly Instructions for EECS 373 Breakout Board

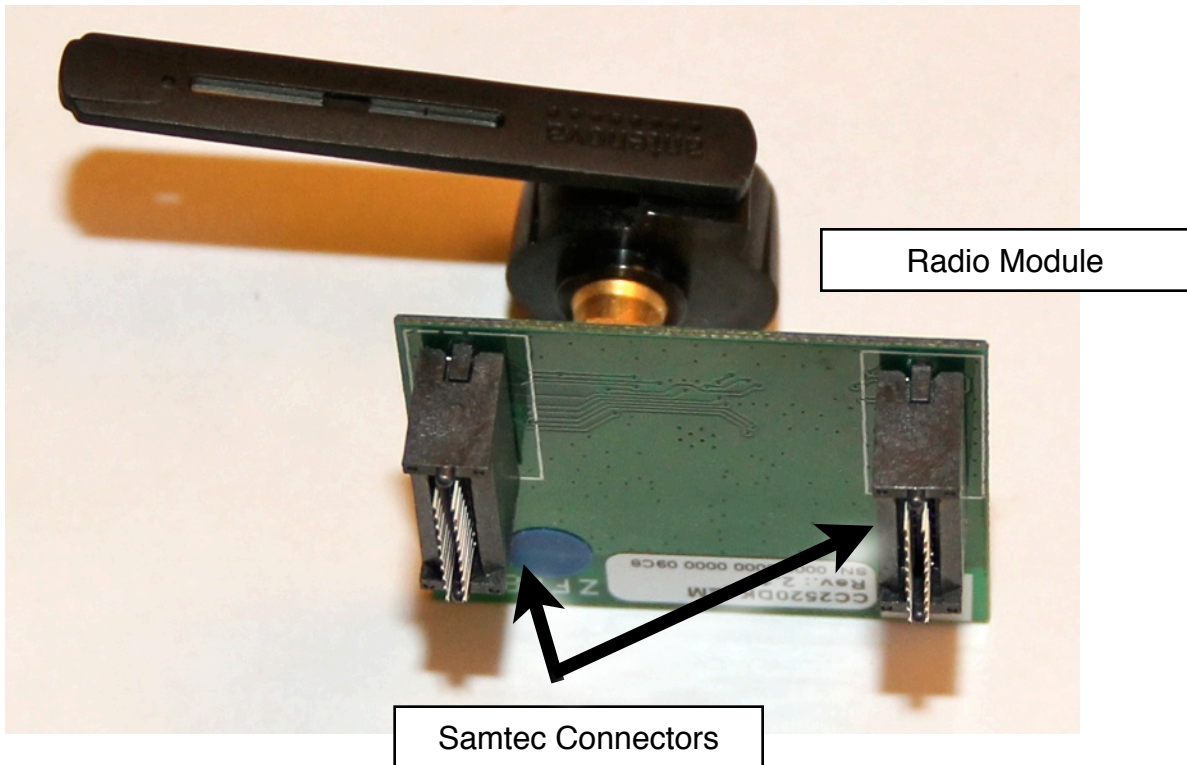
The following steps are instructions on how to assemble your EECS 373 Breakout Board. You should have the following parts for the assembly:

| Amount | Description                                   | Board Designator |
|--------|---|------------------|
| 1x     | PCB with pre-mounted Board-to-Board connector | (P1)             |
| 1x     | 38-pin 100mil header                          | (P8)             |
| 2x     | 2-ping 100 mil header                         | (P10)            |
| 1x     | TI CC2520EM Radio board                       |                  |
| 2x     | BNC socket right angle                        | (P4, P5)         |
| 4x     | Stick-on Standoffs (Bottom)                   |                  |
| 2x     | 2-row-20-pin Samtec connector                 | (P2, P3)         |
| 2x     | 0.1 uF 0603 SMD Capacitor                     | (C1, C4)         |
| 2x     | 1.0 uF 0603 SMD Capacitor                     | (C2, C5)         |
| 2x     | 10 uF 0603 SMD Capacitor                      | (C3, C6)         |



## Step 1

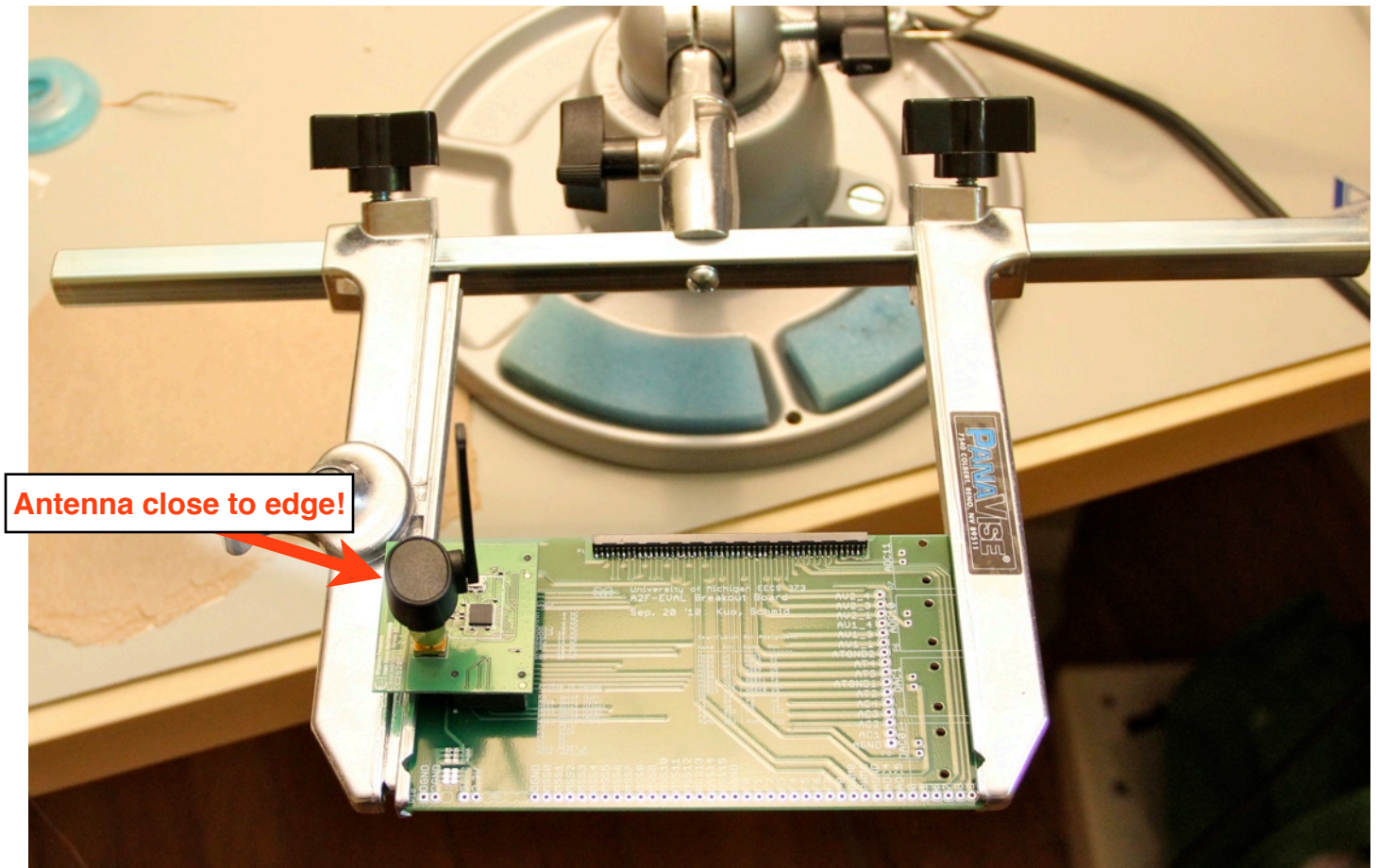
Attach the two Samtec Connectors to the bottom of the radio module. This is to assure that you mount them the right way (they are coded with a small notch).



## Step 2: Aligning Samtec Connectors

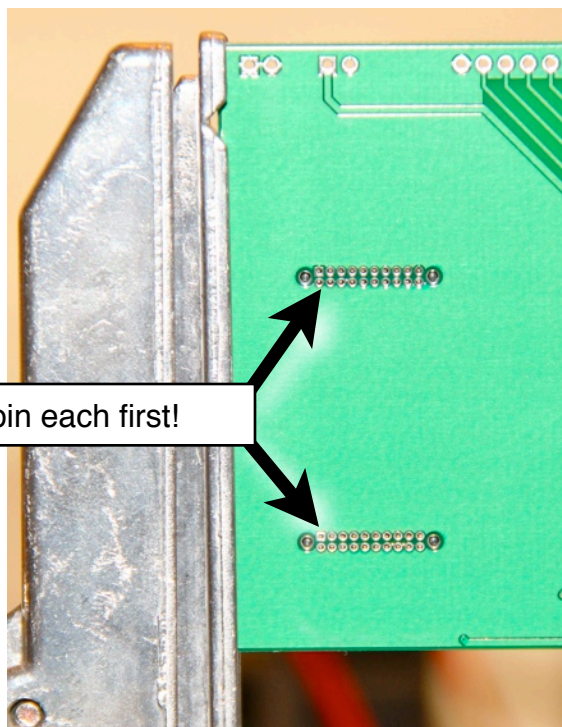
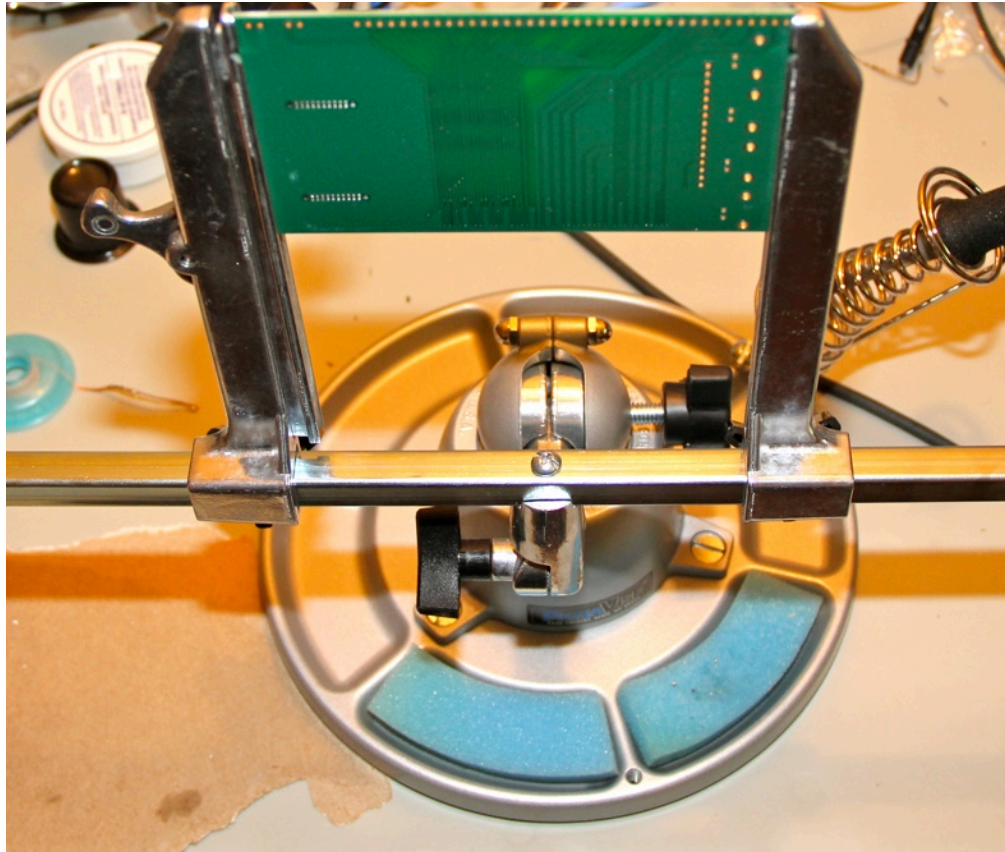
Mount the PCB on the PCB holder, silkscreen to the top, and put the Radio Module with the Samtec connectors attached onto the board as shown below.

**Note:** The antenna must be close to the edge of the PCB.



### Step 3: Soldering Samtec Connector

Place the board holder in a vertical position, while holding the Radio to the board. Then, solder 1 pin of each connector of the Radio board, while holding it tight to the PCB. Make sure you can see all the pin wires in the holes before you start soldering all of them.



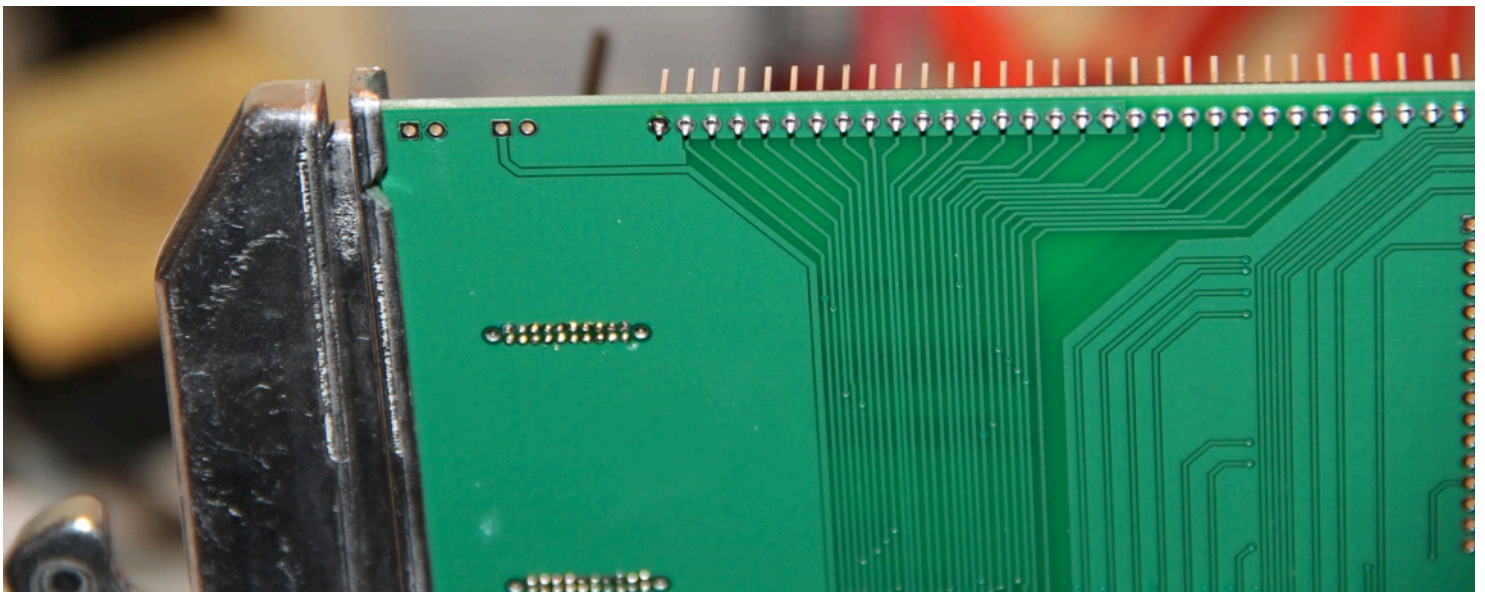
Do not solder these two!  
They are for stability and  
part alignment only.

## Step 4: 100mil Header

Attach the 38-pin 100mil connector to the top of the board. Solder only 1 pin first, while making sure that the headers are nicely upright on the board. As long as there is only one pin, it is easy to reheat the solder and adjust the whole connector.

**CAUTION:** Do not touch the pin while or shortly after you are soldering it! You can get a significant burn from it.

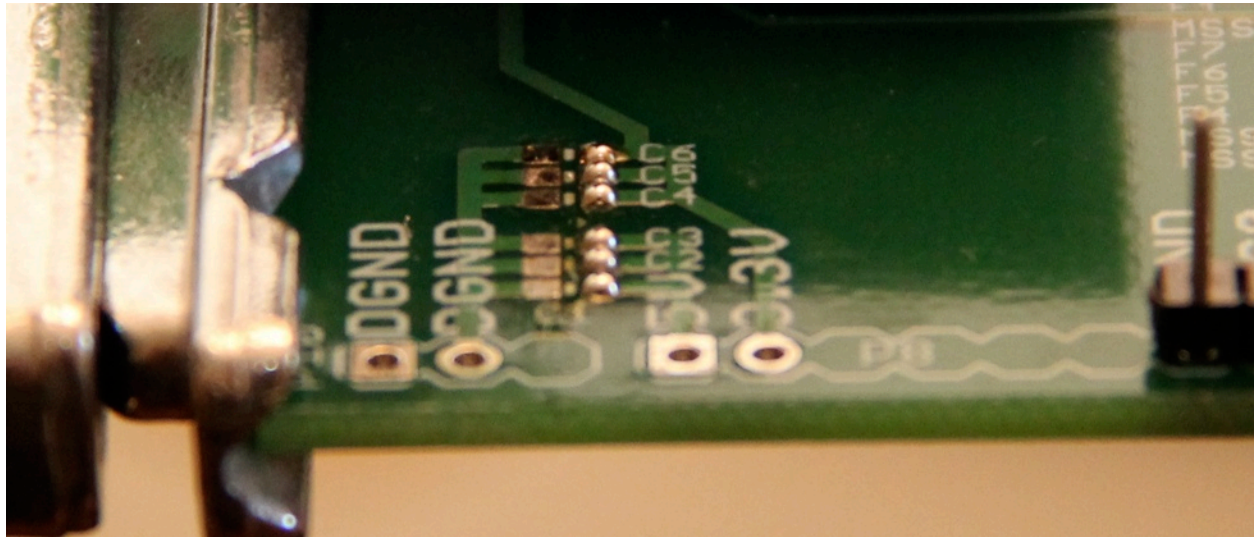
Once the connector is straight, finish soldering every pin.



## Step 5: SMD Capacitors

**Note:** the following instructions are for people who hold the soldering iron in their right hand. If you prefer your left hand, you should probably mirror every instruction.

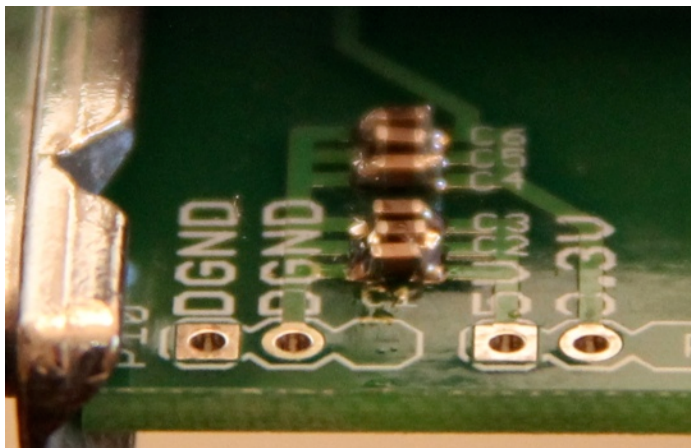
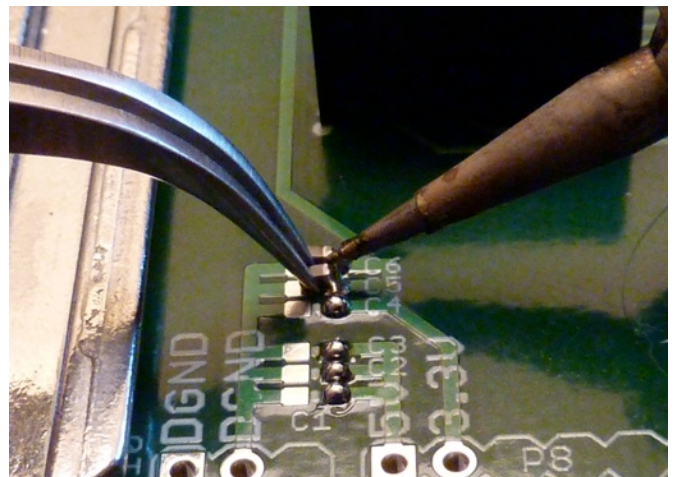
Now we will solder the 6 SMD capacitors. Start off with putting some solder on the right pad of their footprint.



Using the tweezers, grab a 10  $\mu\text{F}$  capacitor. Hold it close to the right pad of C6. While heating the solder blob of C6, move the capacitor onto the pad. Repeat for C5, C5, C3, C2, and C1 with the following values for each capacitor:

C5: 1.0  $\mu\text{F}$   
C4: 0.1  $\mu\text{F}$   
C3: 10.0  $\mu\text{F}$   
C2: 1.0  $\mu\text{F}$   
C1: 0.1  $\mu\text{F}$

Finish by soldering the other end of each capacitor.



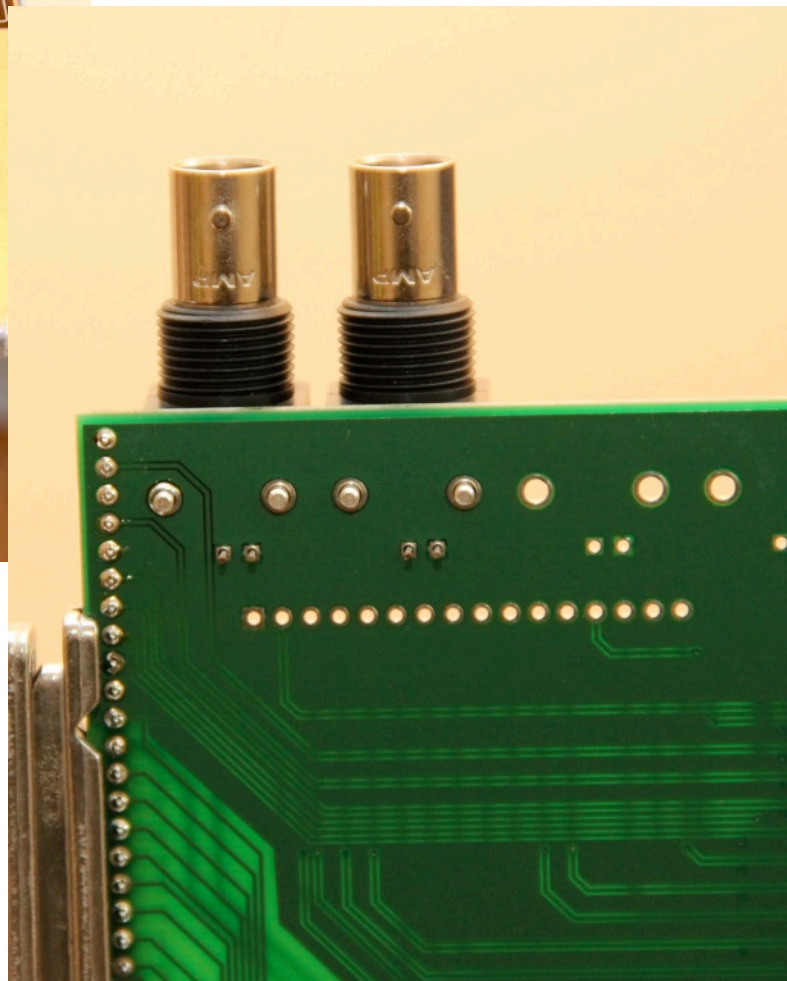
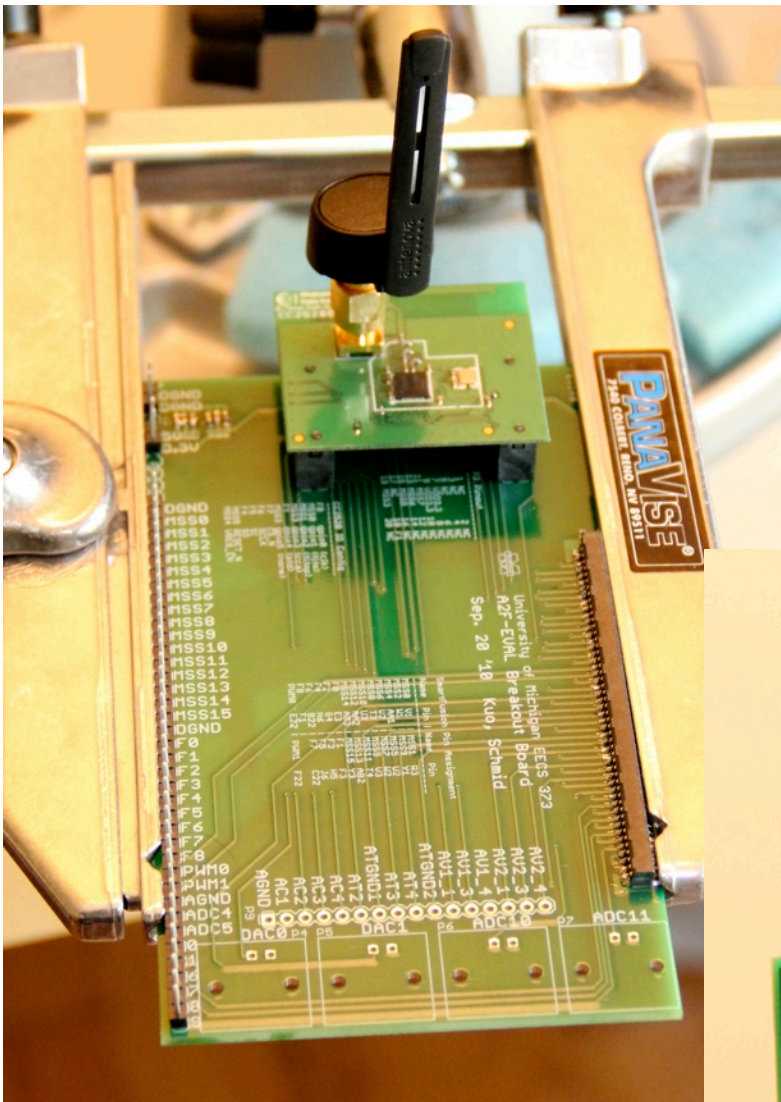
To see a video of the procedure, go here:  
<http://vimeo.com/15718850>

## **Step 6: Power Headers**

Add the two 2-pin 100mil headers. This is a little bit tricky as they are pretty small. Be careful not to burn your fingers while holding them. As before, first solder one pin, then the other to make sure you can align them straight.

## Step 7: BNC Connectors

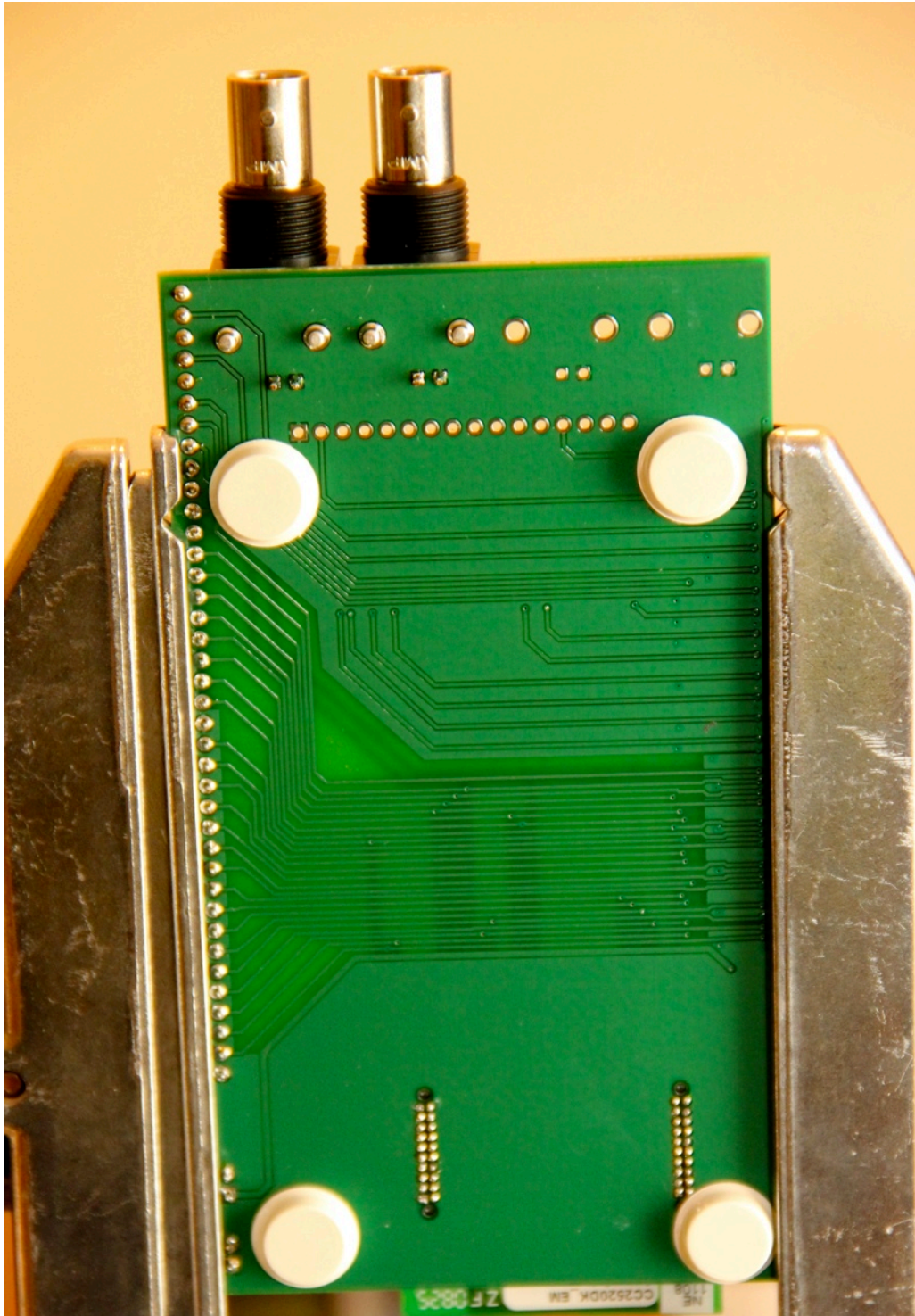
Rotate your board 90° in the PCB holder. Put in the two BNC connectors into DAC0 and DAC1 (P4, and P5 respectively). Note that the two ADC10 and ADC11 are kept empty! Turn the holder into a vertical position, and solder the pins.





## Step 9: Bumpers

Add the 4 standoffs to the bottom of your board as shown below. Make sure that you don't put them above a footprint. You might want to use them later during the project, and thus you should keep them open.



## Step 10: Verification

Optically inspect your PCB. In particular, look for:

- Cold solder joints
- Shorts

Before you plug in your breakout board into the A2F Eval board, measure the resistance between:

- 3.3V -> DGND
- 3.3V -> AGND
- 5V -> DGND
- 5V -> AGND

If any of these resistances is  $< 1\text{M Ohm}$ , then you have a good chance of a short (make sure the radio board is unplugged if you measure these resistances). Ask a lab assistant for help.

As a second verification, as a lab assistant to program your board with a special application. It will make sure that the radio works, and everything is OK with your soldering work.

